Investor sentiment and return predictability in agricultural futures markets

Wang, Changyun
National University of Singapore

January 2000

INVESTOR SENTIMENT AND RETURN PREDICTABILITY IN AGRICULTURAL FUTURES MARKETS

CHANGYUN WANG

This study examines the usefulness of trader-position-based sentiment index for forecasting future prices in six major agricultural futures markets. It has been found that large speculator sentiment forecasts price continuations. In contrast, large hedger sentiment predicts price reversals. Small trader sentiment hardly forecasts future market movements. An investigation was performed into various sentiment-based timing strategies, and it was found that the combination of extreme large trader sentiments provides the strongest timing signal. These results are generally consistent with the hedging-pressure theory, suggesting that hedgers pay risk premiums to transfer nonmarketable risks in futures markets. Moreover, it does not appear that large speculators in the futures markets possess any superior forecasting ability. © 2001 John Wiley & Sons, Inc. Jrl Fut Mark 21:929–952, 2001

The author thanks an anonymous referee for helpful comments. The financial support from the NUS Academic Research Fund is gratefully acknowledged.
For correspondence, Changyun Wang, Department of Finance and Accounting, National University of Singapore, 10 Kent Ridge Crescent, Singapore 119260; e-mail: fbawcy@nus.edu.sg

Received September 2000; Accepted January 2001

■ *Changyun Wang is with the Department of Finance and Accounting at the School of Business at National University of Singapore in Singapore.*

The Journal of Futures Markets, Vol. 21, No. 10, 929–952 (2001)

INTRODUCTION

Commitments of traders (COT) reports that have been published periodically by the Commodity Futures Trading Commission (CFTC) since the early 1980s detail positions taken by the three types of traders—large speculators, large hedgers, and small traders in U.S. futures markets.[1] The unique trader-position information has long been promoted by financial analysts as valuable for timing the market. For instance, Briese (1994) argued that the COT reports could be followed much like SEC insider transaction information to spot profitable opportunities. The article goes on to say that: "(C)ommercials are typically value buyers. When their net buying is near its historical top, it is a tip-off that they think bargains are available. When their net position reaches its lower historical boundary, it usually means that they think tulip-mania has gripped a market" (Briese, 1994, p. 20). Arnold (1995) stated that an understanding of open interest by type of traders was crucial in futures trading, and promoted how to find high profitability trades by examining trader positions.

Do COT reports contain useful information about future market movements in futures markets? If the answer is yes, how does a specific type of traders forecast market movements? How reliable is the forecast? How to enhance returns by making use of trader position information? What is the source of return predictability? Although the unique trader-position information has been watched closely by market users, important issues of whether and how the information may be useful for timing the market have not gained any academic interest.[2] The primary objective of this article is to provide initial empirical evidence on the usefulness of trader-position information for forecasting future market movements in six actively traded agricultural futures markets—corn, soybeans, soymeal, wheat, cotton, and world sugar. To investigate this issue, a sentiment index was constructed for each type of traders. The main difference between these and other sentiment indexes is that these indexes measure investor sentiment based on actual positions taken by each type of traders, while most sentiment indexes are based on the opinions of financial analysts and newsletter writers.

[1]The definition of large speculators, large hedgers, and small traders follows from the CFTC's COT reports. See also 8.

[2]The trader position information is believed to be important in modern days than before because it provides an opportunity to spot the movement of large hedge funds, futures funds, and other large players. William O'Neil, chief futures strategist of Merrill Lynch, made a comment that people are watching this report much more than they used to because of the significant increase in fund's participation in the market, and investors do not want to get caught on the wrong side of a trend when the funds are moving in or out the market (Wall Street Journal, May 2, 1994).

The study of the sentiment by type of traders based on trader actual positions is important for three reasons. First, it allows for an explicit analysis of the usefulness of trader-position information contained in the COT reports. Second, it teaches us about biases in the market forecasts of futures traders. Third, it enables us to earn extra returns by exploiting those biases in agricultural futures markets.

The principal findings are that the sentiments of both large speculators and large hedgers are valuable timing indicators in the agricultural futures markets, but they provide opposite forecasts. Large speculator sentiment is a price-continuation indicator. Contrary to popular beliefs, large hedger sentiment is a contrary indicator.[3] Small trader sentiment hardly forecasts future market movements. Various sentiment-based timing strategies were investigated and compared, and the findings revealed that the combination of extreme large trader sentiments provides the strongest timing signal. The source of return predictability was also examined, and the conclusions drawn were that the results are generally consistent with the hedging-pressure theory in which it is argued that hedgers tend to pay risk premiums to speculators in order to transfer nonmarketable risks, and that futures risk premiums are correlated with hedgers' net positions. Thus, the contrary signal provided by hedger sentiment roughly reflects hedging-pressure effects in futures markets. Moreover, it was found that hedging-pressure effects tend to last for longer horizons than what have been recognized and examined in the extant literature (e.g., Bessembinder, 1992; De Roon, Nijman, & Veld, 2000). Unlike Rockwell (1967) and Chang (1985), no evidence was found of superior forecasting ability possessed by large speculators. Therefore, that speculator sentiment forecasts price continuations simply indicates that large speculators in these markets earn returns for the bearing of risk.

LITERATURE REVIEW

Several studies have investigated the usefulness of various opinion-based sentiment indexes for forecasting returns in equity markets. Solt and Statman (1988) found no statistically significant relation between the sentiment of investment newsletter writers and subsequent stock returns. De Bondt (1993) found that individual investors surveyed by the

[3]Market analysts or newsletter writers argued that hedgers often sit on the right side of a market. For example, Briese (1994, p. 20) wrote: "(I)f you follow only one market, the S&P 500 would be a good choice . . . They (commercials) have shown an uncanny knack for spotting opportunities in the S&P. Historically, a bearish signal has been generated whenever commercials held more short than long contracts."

American Association of Individual Investors (AAII) forecasted future stock prices by extrapolating from price trends. Clarke and Statman (1998) showed that the Bullish Sentiment Index hardly is useful for market timing. More recently, Fisher and Statman (2000) studied the sentiments of three groups of investors—small investors, newsletter writers, and Wall Street strategists—and found that the sentiments of both small investors and Wall Street strategists were reliable contrary indicators for future S&P 500 stock returns, but no statistically significant relation between the sentiment of newsletter writers and stock returns was uncovered. The above studies focus on return predictability of opinion-based sentiments in equity markets. Sanders, Irwin, and Leuthold (1997) investigated the usefulness of the Consensus Bullish Index for forecasting returns in futures markets, and concluded that the sentiment index hardly forecasts futures prices.

Based on causal observations and simple analyses in futures markets, Briese (1994), Arnold (1995), along with Apogee and other investment newsletters, argued that large hedger positions might be a useful straight buying or selling indicator. The results presented here, however, from a comprehensive statistical analysis of the six actively traded agricultural markets, do not support this contention. On the contrary, it was revealed that speculator sentiment provides a valuable straight buying or selling signal. Hedger sentiment is a reliable contrary indicator, i.e., investors are advised to go short when hedgers are turning bullish, and to go long when they are turning bearish.

This study also is related to the hedging-pressure theory that dates back to Keynes (1930) and Hicks (1939). The hedging-pressure theory views futures premiums as directly linked to hedgers' net positions (e.g., Hirshleifer, 1988, 1990; Stoll, 1979). Hedging pressure results from risks that hedgers cannot, or do not want to trade because of market frictions, such as high transaction costs and severe information asymmetries. Therefore, hedgers who use futures markets to avoid risks tend to pay a significant premium to speculators for this insurance. Bessembinder (1992) and De Roon et al. (2000) provided empirical evidence of hedging-pressure effects in broad futures markets, although they did not attempt to measure the extent of hedging pressure effects. Chang (1985) employed a nonparametric approach to examine whether and how price movements in three agricultural futures markets were related to the net positions of large speculators and large hedgers. He found that prices rose more often than expected on a random basis in months when large speculators had net long positions and fell more than expected in months when large hedgers had net long positions. Though it is not the primary interest of this study to test

the validity of hedging-pressure theory, a methodology, similar to that of Rockwell (1967), was used to examine the source of return predictability in agricultural futures markets.

METHODOLOGY AND DATA

Measuring Investor Sentiment

An investor-sentiment index, similar to the COT index in the marketplace, was constructed for each type of trader, based on current aggregate positions and historical extreme values over the previous three years. The sentiment of trader type i in market j at week t is measured as

$$SI_{it}^{j} = \frac{S_{it}^{j} - \min(S_{it}^{j})}{\max(S_{it}^{j}) - \min(S_{it}^{j})}, \tag{1}$$

where S_{i}^{j} is the aggregate position for trader type i at week t detrended using total open interest, i represents large speculators, large hedgers, and small traders, respectively, aggregate position is defined as long open interest less short open interest, and $\max(S_{it}^{j})$ and $\min(S_{it}^{j})$ represent historical maximum and minimum aggregate positions for trader type i in market j over the previous three years.[4]

The investor-sentiment index, rather than net positions or excess long (or short) positions, is chosen to study return predictability in futures markets for the following reasons. First, the sentiment index is similar in nature to other sentiment indexes in the market place, and widely accepted by futures participants. Second, the sentiment index provides a more-intuitive reading of trader actions than the number of long or short contracts. Finally, this measure of investor sentiment allows for comparisons of return predictability across futures markets, while raw positions make the comparisons impossible due to the diverse structure across futures markets.

Return Predictability and Investor Sentiment

To assess whether investor sentiment forecasts future market movements, following Solt and Statman (1988) and Fisher and Statman (2000), the relation between the level of sentiment of each type of

[4]The max and min positions in a five-year moving window were also used as extreme values. The qualitative results remain largely unchanged. To measure investor sentiment in the first year, the max and min aggregate positions were used, starting from 1990 and calculated from the bi-weekly Commitments of Traders reports.

traders and subsequent returns in a futures market was examined. The empirical model used is of the following form

$$R^j_{t+K} = \alpha^j_i + \beta^j_i SI^j_{it} + \varepsilon^j_{it}, \tag{2}$$

where R^j_{t+K} represents percentage returns in market j in the subsequent nonoverlapping K weeks, $K = 2, 4, 6, 8$, and 12, and i represents large speculators, large hedgers, and small traders, respectively.

Unlike the studies in equity market (e.g., Clarke & Statman, 1998), this analysis focuses on the value of forecasts in shorter horizons because the life cycle of a futures contract usually is no more than 3 months (12 weeks).[5] A positive slope coefficient of eq. (2) suggests that the sentiment of a trader group is a straight buying or selling indicator, while a negative slope coefficient implies that the sentiment of a trader type is a contrary indicator.

Various sentiment-based timing strategies were examined. Following the standard practice in empirical finance to study return premiums in equity markets by comparing the returns of equally weighted portfolios, sentiment of a trader type on its median was sorted into two groups: bullish (above-the-median) sentiment group and bearish (below-the-median) sentiment group. The mean holding period return in subsequent periods was calculated for each trader type and the excess return of bullish sentiment group over bearish sentiment group.[6] The mean access return represents the average return for a strategy of simultaneously buying bullish sentiment group and selling bearish sentiment group. If the mean return for the bullish (bearish) sentiment group for a trader type is positive (negative), the sentiment of the type of trader forecasts price continuations. Conversely, if the mean return for the bullish (bearish) sentiment group for a type of trader is negative (positive), the sentiment of the type of trader forecasts price reversals.

To enhance forecast reliability, further investigations were performed into whether the extreme level of investor sentiment provides a stronger timing signal. To test this conjecture, the sentiment of a type of traders was sorted into five groups, and focus was on the mean holding-period

[5]The periods of 16 weeks, 20 weeks, and 26 weeks were included initially, however, none of the results for these forecasting periods that are not reported here are statistically and economically significant.

[6]In this study, raw return rather than abnormal return is used because it usually is regarded that futures trading does not require investment. Compared to securities markets, the term "margin" in futures markets has a different meaning and serves a different purpose. Rather than providing a down payment in equity markets, the margin required to buy or sell a futures contract is solely a deposit of good faith. In addition, margin can be deposited in marketable securities that continue to earn returns in equity or money markets. Therefore, it may be meaningless to calculate abnormal return. See also Stoll (1979, p. 883).

return of the extremely bullish group (top 20%), the extremely bearish group (bottom 20%), and the excess return of the extremely bullish group over the extremely bearish group in subsequent periods.

The above procedure allows us to see that the sentiments of large speculators and large hedgers are valuable for forecasting future market movements, but they provide opposite forecasts. Therefore, it is conceivable that combining the sentiments of the two types of large traders provides a more-reliable tool for forecasting. Two sets of hypotheses are formulated to test the usefulness of the combination of large trader sentiment for forecasting. First, the bullish speculator sentiment, together with the bearish hedger sentiment, predicts positive futures returns, whereas the bearish speculator sentiment, along with the bullish hedger sentiment, forecasts negative returns. Second, extremely bullish speculator sentiment, together with extremely bearish hedger sentiment, predicts positive returns, whereas extremely bearish speculator sentiment, along with extremely bullish hedger sentiment, predicts negative returns. These hypotheses were tested by assessing the mean return for the group with (extremely) bullish speculator sentiment, together with (extremely) bearish hedger sentiment, and for the group with (extremely) bearish speculator sentiment, along with (extremely) bullish hedger sentiment in subsequent periods.

Finally, the source of return predictability in futures markets was examined. The contrary signal provided by hedger sentiment tends to reflect hedging-pressure effects in futures markets. That large speculator sentiment forecasts price continuations is likely to represent either risk premiums paid by hedgers, or superior forecasting ability of large speculators, or both. A methodology, similar to that of Rockwell (1967), was used to test the source of return predictability in these agricultural futures markets. In particular, the hedging pressure effect was defined as the return earned by a hypothetical trader who follows a naïve strategy of being long when hedgers are (extremely) bearish and short when hedgers are (extremely) bullish. The return for a simple strategy by the trader that is contrary to large hedger sentiment roughly measures the extent of hedging pressure effect in the market.[7] A positive mean return earned by large speculators in excess of the hedging-pressure effect represents superior forecasting ability of large speculators.

[7]It should be noted that bullish hedger sentiment does not necessarily coincide with net long positions taken by hedgers, since observations with net short positions taken by hedgers outnumber those with net long positions by hedgers in all markets except corn over the sample period. For example, the number of observations with net short positions is 285 for wheat futures, with total number of observations of 375. However, it is safe to conclude that extremely bullish (bearish) hedger sentiment implies that large hedgers hold net long (short) positions in all markets.

Data

The weekly COT data on corn, soybeans, soymeal, wheat, cotton, and world sugar futures markets over the period from January 1993 to March 2000 was obtained from Pinnacle Data Corporation (Webster, New York). The sample period is chosen because of the nonavailability of weekly data before October 1992. The six markets represent the most actively traded agricultural futures markets that have been extensively studied in prior research. The COT data include Tuesdays' closing positions aggregated for all outstanding contracts by commercial traders (large hedgers), noncommercial traders (large speculators), and small traders.[8] This information, published weekly on Fridays since November 1992, relates to closing positions on the preceding Tuesdays. Data also was obtained on corn, soybeans, soymeal, wheat, cotton, and world sugar Tuesdays' settlement prices over the same period. These data are collected from Datastream International.

Table I provides summary statistics for weekly returns, sentiment by type of traders, and correlation matrix between sentiment by type of traders in the six futures markets over the sample period. Panel A of Table I shows that the average weekly return in these futures markets is rather small, with the exception of world sugar (in which the average weekly return is −0.134%, or an annualized return of 7%). It is positive only for corn and cotton futures. This implies that a simple trading strategy of consistently holding either a long or short position would not earn any significant profit in these markets. Panel B of Table I reports mean investor sentiment by type of traders. The average sentiment for each type of trader does not appear to vary significantly across the markets. However, the sentiment of the two types of large traders tends to be more variable than small trader sentiment. This suggests that small traders, on average, trade less actively than do large traders. From Panel C of Table I, it is noted that the sentiments of large speculators and large hedgers are highly negatively correlated, so are the sentiments of small traders and large hedgers in the futures markets with the exception of wheat futures. The correlation coefficients between the sentiments of large

[8]Both commercial and noncommercial traders are those whose positions exceed the CFTC reporting level (150 contracts, 100 contracts, 175 contracts, 100 contracts, 5000 bales, and 300 contracts for corn, soybeans, soymeal, wheat, cotton, and world sugar, respectively, as of the end of 1999). In order to be classified as commercial-trader category, the trader's futures positions have to be taken for hedging purposes. Small traders are those whose positions do not exceed the CFTC reporting levels. Because a commercial position is one that is taken to hedge a specific risk, investors taking reportable commercial positions are referred to as large hedgers, while those taking reportable noncommercial positions are referred to as large speculators.

TABLE I
Summary Statistics (1993.1–2000.3)

Panel A: Summary Statistics for Weekly Futures Returns (%)

	Corn	*Soybeans*	*Soymeal*	*Wheat*	*Cotton*	*World Sugar*	*Agricultural Portfolio*
Mean	0.009	−0.028	−0.032	−0.079	0.013	−0.134	−0.042
Maximum	13.511	9.700	13.621	14.242	10.86	14.431	10.38
Minimum	−14.867	−19.906	−20.593	−17.658	−33.55	−17.316	−7.809
Std. Dev.	3.274	3.013	3.457	3.496	3.623	4.319	2.196
No of obs.	375	375	375	375	375	375	375

Panel B: Investor Sentiment by Type of Traders

	Large Speculator		*Large Hedger*		*Small Trader*	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Corn	44.19	28.03	52.78	28.75	40.92	26.84
Soybeans	48.70	30.55	52.92	27.17	45.90	24.50
Soymeal	49.77	27.98	49.42	26.84	48.59	21.73
Wheat	49.42	29.84	48.09	28.49	54.84	27.92
Cotton	42.31	29.34	41.41	25.84	58.88	27.48
World sugar	44.94	28.41	55.48	28.13	46.83	22.59

Panel C: Correlation Matrix of Investor Sentiments by Type of Traders

		Large Speculator	*Large Hedger*
Corn	Large hedger	−0.89	1.00
	Small trader	−0.06	−0.29
Soybeans	Large hedger	−0.94	1.00
	Small trader	0.49	−0.73
Soymeal	Large hedger	−0.93	1.00
	Small trader	0.64	−0.80
Wheat	Large hedger	−0.90	1.00
	Small trader	0.04	0.29
Cotton	Large hedger	−0.89	1.00
	Small trader	0.35	−0.27
	Large hedger	−0.96	1.00
World sugar	Small trader	0.84	−0.87

The return for the agricultural portfolio is the arithmetic mean of the six commodity futures returns.

speculators and large hedgers are −0.89, −0.94, −0.93, −0.90, −0.89, and −0.96 for corn, soybeans, soymeal, wheat, cotton, and sugar futures, respectively. Small trader sentiment tends to vary positively with large speculator sentiment for all except corn futures (in which the correlation coefficient is −0.06).

EMPIRICAL RESULTS

Level of Sentiment by Type of Traders and Futures Returns

Panels A, B, and C of Table II report the regression results of estimating eq. (2) for each type of trader in the agricultural markets. To save space, only estimated slope coefficients are reported. Panel A of Table II shows that the relation between large speculator sentiment and futures returns is positive for all except cotton futures in the period of 2 weeks, and statistically significant at the 10% level or higher for the forecasting periods of 4 weeks, 6 weeks, and 8 weeks, except for soybeans and cotton futures in the period of 8 weeks. Consider the relation between large speculator sentiment and holding-period returns in the period of 4 weeks for wheat futures, an increase of 1 percentage point in large speculator sentiment is associated, on average, with a 0.07 percentage-point increase in futures returns in the subsequent 4 weeks. The last row of Panel A reports the results estimated with time-series data pooled across the six futures markets. All the estimated slope coefficients are positive and statistically significant at the 1% level except for the periods of 2 weeks and 12 weeks. Consistent with the argument in Sanders et al. (1997), pooling time-series data across markets increases the power of the tests. In addition, this approach provides a concise way of presenting and testing for return predictability of sentiment by type of traders in similar markets.

The regression results for large hedgers are reported in Panel B of Table II. Strikingly, the slope coefficient estimates are all negative, and statistically significant at the 10% level or higher for all except the periods of 2 weeks and 12 weeks. This suggests that an increase in large hedger sentiment is associated, on average, with a subsequent drop in futures prices. For example, an increase of 1 percentage point in hedger sentiment is associated, on average, with 0.07 percentage-point decrease in wheat futures returns in the subsequent 4 weeks. The results from pooled regressions indicate that the slope coefficients are all negative and statistically significant at the 1% level for the periods of 4 weeks, 6 weeks, and 8 weeks.

However, it does not appear that small trader sentiment is useful for predicting futures returns. As shown in Panel C of Table II, all slope coefficient estimates are not statistically significant. This is in line with the evidence reported in Table I, that small traders tend to be passive traders.

In sum, the regression results show that large speculator sentiment provides a straight buying and selling signal, large hedger sentiment is a contrary indicator, and small trader sentiment does not predict future

TABLE II

The Relation Between the Level of Sentiment by Type of Traders and Futures Returns (%) in Subsequent (Nonoverlapping) Periods (1993.1–2000.3)

	2 Week	*4 Week*	*6 Week*	*8 Week*	*12 Week*
Panel A: Large Speculators					
Corn	0.005	0.044	0.084	0.092	0.063
	(0.39)	(2.14)	(2.91)	(2.12)	(1.18)
Soybeans	0.001	0.019	0.031	0.028	0.012
	(0.12)	(1.79)	(1.97)	(0.74)	(0.02)
Soymeal	0.006	0.028	0.056	0.043	0.031
	(0.52)	(1.80)	(1.98)	(1.74)	(0.43)
Wheat	0.001	0.049	0.067	0.065	0.069
	(0.22)	(2.06)	(2.14)	(1.82)	(1.29)
Cotton	−0.008	0.021	0.056	0.013	0.037
	(−0.53)	(1.66)	(1.78)	(0.67)	(1.39)
World sugar	0.003	0.040	0.064	0.062	0.001
	(0.16)	(1.71)	(1.96)	(1.72)	(0.01)
Agricultural portfolio	0.001	0.032	0.058	0.041	0.027
	(0.10)	(3.63)	(4.28)	(2.71)	(1.03)
Panel B: Large Hedgers					
Corn	−0.012	−0.050	−0.090	−0.110	−0.082
	(−0.90)	(−2.37)	(−3.09)	(−2.23)	(−1.34)
Soybeans	−0.008	−0.024	−0.039	−0.032	−0.011
	(−0.56)	(−1.72)	(−1.75)	(−1.74)	(−0.21)
Soymeal	−0.003	−0.028	−0.052	−0.042	−0.023
	(−0.39)	(−1.77)	(−1.88)	(−1.68)	(−0.30)
Wheat	−0.002	−0.053	−0.069	−0.064	−0.058
	(−0.11)	(−2.05)	(−2.01)	(−1.84)	(−1.09)
Cotton	−0.021	−0.024	−0.031	−0.029	−0.061
	(−1.02)	(−1.78)	(−1.69)	(−1.66)	(−0.79)
World sugar	−0.002	−0.042	−0.071	−0.063	−0.001
	(−0.09)	(−1.86)	(−2.11)	(−1.74)	(−0.19)
Agricultural portfolio	−0.006	−0.037	−0.058	−0.046	−0.042
	(−0.93)	(−3.66)	(−3.86)	(−2.69)	(−1.46)
Panel C: Small Traders					
Corn	0.011	0.012	0.023	0.015	−0.002
	(0.75)	(0.51)	(0.53)	(0.29)	(−0.03)
Soybeans	0.001	0.013	0.021	0.030	0.019
	(1.52)	(1.32)	(1.12)	(0.95)	(0.77)
Soymeal	−0.003	0.025	0.033	0.034	0.009
	(−0.22)	(1.05)	(0.71)	(0.61)	(0.09)
Wheat	−0.001	−0.004	−0.010	−0.007	−0.037
	(−0.38)	(−0.20)	(−0.26)	(−0.12)	(−0.52)
Cotton	0.013	−0.012	−0.046	0.014	−0.011
	(0.81)	(−0.47)	(−1.29)	(0.28)	(−0.12)
World sugar	−0.002	0.009	0.032	0.060	−0.002
	(−0.10)	(1.36)	(1.21)	(0.92)	(−0.09)
Agricultural portfolio	0.005	0.011	0.014	0.025	0.002
	(0.77)	(1.15)	(0.86)	(1.20)	(0.07)

The regression results are from the estimation of eq. (2) with weekly observations. Only slope coefficients are reported. The numbers in parentheses are *t*-statistics under the null hypothesis that the relevant parameter is zero, computed using White (1980) heteroskedasticity consistent standard errors.

market movements. Therefore, in the subsequent analysis, attention will be focused on timing strategies based on the sentiments of large speculators and large hedgers in the periods of 2 weeks, 4 weeks, 6 weeks, and 8 weeks.[9]

Given the above results, it would be expected that bullish speculator sentiment predicts positive returns, while bearish speculator sentiment predicts negative returns. Conversely, bullish hedger sentiment predicts negative returns, and bearish hedger sentiment predicts positive returns. To test these hypotheses, large trader sentiment on its median was sorted into two groups: H and L. H represents the group with bullish (above-the-median) sentiment, and L represents the group with bearish (below-the-median) sentiment. The average holding-period return for H and L in the subsequent periods is calculated. Also calculated is the mean return for HML, which represents a strategy of simultaneously buying H and selling L. These results, which are broadly consistent with the previous evidence, are reported in Panels A and B of Table III.

Panel A of Table III presents the result for large speculators. The mean return for H is positive for all except soybeans, soymeal, and wheat futures in the period of 2 weeks, but is not statistically significant different from zero, except for corn futures and the agricultural portfolio in the periods of 4 weeks, 6 weeks, and 8 weeks. The mean return for L is negative, and significant for all forecasting periods except the period of 2 weeks, and for all markets except cotton futures. For the futures portfolio, the mean return for L is −1.01%, −1.22%, and −1.44% in the subsequent periods of 4 weeks, 6 weeks, and 8 weeks, respectively. This result suggests that speculator sentiment based on the deviation from its median tends to provide a more-reliable selling signal than a buying signal. The mean return for HML is positive and significant for all periods except the period of 2 weeks, and for all markets except cotton futures (in which it is significant at the 10% level only in the period of 4 weeks).

The results for large hedgers are reported in Panel B of Table III. As expected, the mean return for H is negative and significant for all except soybeans, wheat, and sugar futures in the period of 2 weeks. The average return for L is positive for all except soymeal, wheat, and sugar in the period of 2 weeks, and significant for all markets except soybeans and sugar futures. It is also noted that the mean return of selling H is larger than that of buying L, with the exception of corn futures. Again, this

[9]The period of 2 weeks was kept in the subsequent analysis because, under certain circumstances, it was found that the sentiments of large speculators and large hedgers had some forecasting power in this short horizon.

TABLE III

Bullish (Bearish) Large Trader Sentiment and Futures Returns (%) in Subsequent Periods (1993.1–2000.3)

	2 Week			*4 Week*			*6 Week*			*8 Week*		
	H	*L*	*HML*	*H*	*L*	*HML*	*H*	*L*	*HML*	*H*	*L*	*HML*
Panel A: Large Speculators												
Corn	0.306	−0.326	0.629	1.092	−1.122	2.198	1.401	−1.369	2.733	1.745	−1.603	3.282
	(0.94)	(−0.96)	(1.34)	(2.37)	(−2.39)	(3.36)	(2.24)	(−2.49)	(3.30)	(2.32)	(−2.43)	(3.12)
Soybeans	−0.079	−0.136	0.066	0.418	−0.654	1.073	0.501	−0.868	1.351	0.514	−0.984	1.493
	(−0.26)	(−0.12)	(0.36)	(1.02)	(−1.78)	(1.97)	(1.09)	(−1.87)	(2.06)	(0.93)	(−1.91)	(2.01)
Soymeal	−0.042)	−0.073	0.030	0.463	−0.683	1.132	0.504	−0.843	1.326	0.688	−1.110	1.788
	(−0.11)	(−0.21)	(0.12)	(1.01)	(−1.76)	(2.02)	(0.89)	(−1.74)	(1.97)	(1.18)	(−1.87)	(2.08)
Wheat	−0.026	−0.397	0.366	0.636	−1.450	2.067	0.677	−1.935	2.574	0.970	−2.529	3.421
	(−0.07)	(−1.12)	(0.70)	(1.21)	(−3.21)	(2.99)	(1.09)	(−3.43)	(3.08)	(1.31)	(−4.07)	(3.69)
Cotton	0.022	−0.081	0.120	0.192	−0.252	0.486	0.112	−0.201	0.398	0.201	−0.302	0.601
	(0.46)	(−0.68)	(0.79)	(0.32)	(−0.68)	(1.68)	(1.29)	(−0.57)	(0.85)	(1.44)	(−0.86)	(0.99)
World sugar	0.068	−0.684	0.746	0.741	−1.911	2.621	0.749	−2.440	3.124	0.514	−2.752	3.163
	(0.16)	(−1.44)	(1.25)	(1.50)	(−2.97)	(3.12)	(1.21)	(−3.01)	(3.11)	(0.69)	(−2.89)	(2.62)
Agricultural portfolio	0.002	−0.217	0.219	0.587	−1.012	1.589	0.606	−1.223	1.809	0.645	−1.440	2.053
	(0.24)	(−1.56)	(1.01)	(2.87)	(−5.14)	(5.65)	(2.36)	(−5.09)	(5.27)	(2.14)	(−5.20)	(5.10)
Panel B: Large Hedgers												
Corn	−0.509	0.535	−1.012	−1.587	1.629	−3.192	−2.195	2.319	−4.414	−2.671	2.867	−3.509
	(−1.73)	(1.72)	(−2.08)	(−3.25)	(3.84)	(−4.90)	(−3.17)	(4.14)	(−3.38)	(−3.80)	(4.34)	(−3.54)
Soybeans	−0.171	0.017	−0.191	−0.775	0.488	−1.258	−0.927	0.502	−1.410	−1.247	0.721	−1.967
	(−0.57)	(0.45)	(−1.27)	(−2.19)	(1.18)	(−2.01)	(−1.92)	(1.05)	(−2.03)	(−2.21)	(1.37)	(−2.25)
Soymeal	−0.245	−0.060	−0.185	−0.377	0.148	−0.524	−0.454	0.409	−0.859	−0.745	0.889	−1.634
	(−0.71)	(−1.01)	(−1.28)	(−1.85)	(1.72)	(−1.99)	(−0.84)	(1.75)	(2.10)	(−1.19)	(1.88)	(−2.41)
Wheat	−0.177	−0.021	−0.156	−1.315	0.547	−1.846	−2.031	0.853	−2.843	−2.571	1.021	−3.520
	(−1.11)	(−0.02)	(−0.75)	(−2.89)	(1.66)	(−2.47)	(−3.81)	(1.67)	(−3.21)	(−4.21)	(1.58)	(−3.57)
Cotton	−0.614	0.562	−1.169	−1.123	0.973	−2.079	−1.645	1.402	−3.003	−1.936	1.598	−3.462
	(−2.19)	(1.23)	(−2.22)	(−2.93)	(1.69)	(−2.91)	(−3.71)	(1.88)	(−3.35)	(−3.83)	(1.86)	(−3.46)
World sugar	−0.319	−0.253	−0.062	−1.659	0.537	−2.170	−2.284	0.712	−2.935	−2.464	0.373	−2.745
	(−0.69)	(−0.62)	(−0.10)	(−2.56)	(1.03)	(−2.74)	(−2.77)	(1.17)	(−2.97)	(−2.54)	(0.51)	(−2.36)
Agricultural portfoilo	−0.255	0.056	−0.309	−1.134	0.725	−1.846	−1.580	0.985	−2.533	−1.929	1.153	−3.029
	(−1.79)	(0.37)	(1.73)	(−5.81)	(3.53)	(−6.46)	(−6.64)	(3.85)	(−7.20)	(−6.97)	(3.89)	(−7.45)

Investor sentiment is grouped on the basis of its medians. H represents the group with bullish (above-the-median) sentiment. L represents the group with bearish (below-the-median) sentiment. The numbers in parentheses are *t*-statistics under the null hypothesis that the relevant parameter is zero, and are corrected for heteroskedasticity and autocorrelation based on Newey–West (1987) adjustment.

suggests that large hedger sentiment provides a more reliable selling signal than a buying signal.[10] The mean return for HML is negative and statistically significant at the 10% level or higher for all periods except the period of 2 weeks (in which it is significant for corn and cotton futures, as well as the agricultural portfolio). Consider the agricultural portfolio for the period of 4 weeks, buying L and selling H produce a return of 0.73% and 1.13%, respectively, while a strategy of simultaneous buying L and selling H gives rise an average return of 1.85%.

Extreme Levels of Large Trader Sentiments and Futures Returns

From practitioners' perspective, it is of importance to identify a more-reliable and more-profitable sentiment-based timing strategy. In this and the subsequent subsections, certain sentiment based timing strategies are examined, aiming at identifying the most-reliable and most-profitable timing strategy. The previous result indicates that the sentiments of large speculators and large hedgers forecast futures returns. As an extension of the result, it is expected that the extreme level of large trader sentiment would provide a stronger market-timing signal. Specifically, extreme speculator sentiment is correlated more positively with future market movements. Conversely, extreme hedger sentiment is correlated more negatively with future market movements. These hypotheses were tested by sorting large trader sentiment into five groups, with focus on the mean return for the group with extremely bullish sentiment (top 20%) and for the group with extremely bearish sentiment (bottom 20%) in the subsequent periods of 2 weeks, 4 weeks, 6 weeks, and 8 weeks. Let EH represent the group with extremely bullish sentiment (top 20%), and EL represent the group with extremely bearish sentiment (bottom 20%). The mean return for EH and EL is reported in Panels A and B of Table IV. Also reported is the return for EHML that represents a strategy of simultaneously buying EH and selling EL.

Panel A of Table IV presents the results for large speculators. The mean return for EH is positive for all except soybeans and soymeal futures in the period of 2 weeks, and is significantly different from zero

[10]The evidence that the sentiments of large hedgers based on the median provide a more reliable selling signal than a buying signal may not necessarily contradict the hedging-pressure theory that does not specify this asymmetry in futures risk premiums. This is likely due to that fact that the number of observations with net short positions taken by hedgers exceeds the number of observations with net long positions, except for corn futures. See also 7. Nevertheless, the evidence generally confirms the previous regression results. In the later analysis, more reliable forecasts provided by investor sentiment were uncovered.

TABLE IV

Extreme Large Trader Sentiments and Futures Returns (%) in the Subsequent Periods (1993.1–2000.3)

	2 Week			*4 Week*			*6 Week*			*8 Week*		
	EH	*EL*	*EHML*	*EH*	*EL*	*EHML*	*EH*	*EL*	*EHML*	*EH*	*EL*	*EHML*
Panel A: Large Speculators												
Corn	1.113	−0.133	1.216	3.013	−0.759	3.651	4.641	−0.187	4.719	5.460	−0.133	5.546
	(2.95)	(−0.23)	(1.85)	(6.48)	(−1.02)	(4.24)	(8.24)	(−1.46)	(5.04)	(9.77)	(−0.30)	(5.04)
Soybeans	0.111	−0.339	0.450	0.235	−0.955	1.184	0.278	−0.420	0.684	0.470	−0.241	0.704
	(0.79)	(−0.78)	(0.76)	(1.84)	(−1.99)	(2.21)	(2.01)	(−1.50)	(1.69)	(1.80)	(−1.05)	(1.65)
Soymeal	0.111	−0.297	0.185	1.634	−1.285	2.835	1.669	−1.203	2.742	1.263	−1.360	2.486
	(0.22)	(−0.68)	(0.31)	(2.33)	(−2.13)	(3.71)	(1.89)	(−1.67)	(2.73)	(1.12)	(−1.72)	(1.90)
Wheat	0.472	−0.345	0.818	2.199	−1.802	4.001	3.003	−1.927	4.891	3.313	−2.449	5.717
	(0.86)	(−0.64)	(1.03)	(3.08)	(−1.88)	(4.49)	(3.30)	(−2.24)	(4.11)	(3.17)	(−2.56)	(4.41)
Cotton	0.467	0.395	0.059	2.028	0.081	1.864	2.497	−0.405	2.734	1.987	−0.278	2.904
	(0.78)	(0.86)	(1.56)	(2.29)	(0.15)	(2.10)	(2.12)	(−0.71)	(2.31)	(2.28)	(−0.59)	(2.08)
World sugar	0.098	−0.998	1.069	0.762	−2.599	3.256	0.856	−2.998	3.735	0.466	−2.516	2.911
	(0.21)	(−1.36)	(1.50)	(1.16)	(−2.35)	(2.68)	(1.09)	(−2.30)	(2.47)	(0.98)	(−1.68)	(1.86)
Agricultural portfolio	0.288	−0.283	0.565	1.643	−1.209	2.800	2.152	−1.176	3.220	2.480	−1.035	3.344
	(1.45)	(−1.28)	(1.99)	(5.75)	(−4.06)	(7.35)	(5.93)	(−3.36)	(6.81)	(5.66)	(−2.60)	(6.07)
Panel B: Large Hedgers												
Corn	−0.099	0.728	−0.808	−1.072	2.561	−3.530	−1.651	4.033	−5.413	−1.951	5.856	−7.339
	(−0.18)	(2.04)	(−1.98)	(−1.72)	(4.99)	(−4.02)	(−1.90)	(6.41)	(−5.41)	(−1.84)	(7.41)	(−6.06)
Soybeans	−0.127	0.033	−0.161	−0.772	0.509	−1.256	−0.772	0.298	−1.051	−0.769	0.330	−1.031
	(−0.75)	(0.01)	(−1.26)	(−1.68)	(0.73)	(−1.79)	(−1.92)	(0.73)	(−1.63)	(−1.92)	(0.98)	(−1.79)
Soymeal	−0.434	0.088	−0.501	−1.695	1.590	−3.220	−1.661	1.529	−3.086	−1.313	1.245	−2.439
	(−1.04)	(0.16)	(−0.59)	(−2.96)	(2.30)	(−3.54)	(−2.05)	(1.85)	(−2.53)	(−1.68)	(1.62)	(−1.98)
Wheat	−0.397	0.937	−1.335	−1.669	2.891	−4.560	−1.525	3.845	−5.318	−1.624	4.720	−6.280
	(−0.72)	(1.86)	(−1.86)	(−2.22)	(4.39)	(−5.29)	(−1.76)	(4.57)	(−4.98)	(−1.78)	(5.33)	(−5.39)
Cotton	−0.038	0.649	−0.688	−0.496	1.355	−1.833	−0.655	1.143	−1.754	−0.639	1.319	−1.987
	(−0.08)	(0.72)	(−0.86)	(−0.80)	(1.69)	(−1.79)	(−0.98)	(1.80)	(−1.99)	(−1.29)	(1.83)	(−0.55)
World sugar	−0.954	0.010	−0.939	−2.879	0.674	−3.436	−3.235	0.834	−3.938	−3.583	0.491	−3.832
	(−1.31)	(0.02)	(−1.04)	(−2.77)	(0.97)	(−2.56)	(−2.56)	(1.04)	(−2.49)	(−2.41)	(1.07)	(−2.10)
Agricultural portfolio	−0.339	0.352	−0.683	−1.425	1.600	−2.974	−1.583	1.947	−3.431	−1.656	2.109	−3.621
	(−1.59)	(1.71)	(−2.20)	(−4.74)	(5.13)	(−6.89)	(−4.39)	(4.96)	(−6.56)	(−3.95)	(4.50)	(−5.99)

EH represents the group with extremely bullish sentiment (top 20%). EL represents the group with extremely bearish sentiment (bottom 20%). EHML represents a strategy of buying EH and selling EL. The numbers in parentheses are *t*-statistics under the null hypothesis that the relevant parameter is zero, and are corrected for heteroskedasticity and autocorrelation based on Newey–West (1987) adjustment.

for all markets except sugar futures, and for all periods except the period of 2 weeks (in which it is significant only for corn futures). The mean return for EL is negative for all except cotton futures in the period of 2 weeks, and is statistically significant for all forecasting periods except the period of 2 weeks, and for all markets except corn and cotton futures. Notice that the absolute average return for EH generally is larger than that for EL, with the exception of soybeans and sugar futures, suggesting that extremely bullish speculator sentiment provides a more-reliable buying signal than a selling signal. The mean return for HML is positive and statistically significant for all except the period of 2 weeks. For example, the average return for HML in the portfolio is 3.22% in the period of 6 weeks. This suggests that simultaneously buying EH and selling EL, on average, produce an average return of about 3% in the subsequent 6 weeks.

In contrast, the results for large hedgers reported in Panel B of Table IV show that the mean return for EH is negative and statistically significant for all periods except the period of 2 weeks, and for all markets except cotton futures. The mean return for EL is positive and statistically significant for all except soybeans and sugar futures. Consider the holding period of 4 weeks in the agricultural portfolio, the mean return of selling EH and buying EL is about 1.43% and 1.60% in the subsequent period of 4 weeks, respectively, and the mean return of simultaneously buying EH and selling EL is 2.97%. It appears that extremely large hedger sentiment is, on average, a stronger timing indicator than extremely large speculator sentiment. This can be seen from the mean return for EHML in Panels A and B of Table IV. The mean return for EHML based on large hedger sentiment is larger in absolute terms than that based on large speculator sentiment.

Combinations of Large Trader Sentiments and Futures Returns

It has been shown that the sentiments of both large speculators and large hedgers predict futures returns, but they provide opposite forecasts. A logical extension of this finding is that the combination of the large trader sentiments may provide a more-reliable market-timing signal. This conjecture is tested using the two sets of hypotheses previously formulated in the Methodology and Data section.

To test the first set of hypotheses, large trader sentiment is sorted on its median into two groups: C and D. C represents the group with

bullish (above-the-median) speculator sentiment, together with bearish (below-the-median) hedger sentiment. D represents the group with bearish (below-the-median) speculator sentiment, together with bullish (above-the-median) hedger sentiment. The mean return is calculated for C and D in the subsequent periods of 2 weeks, 4 weeks, 6 weeks, and 8 weeks.

The results are presented in Panel A of Table IV. Also reported is the mean return for CMD that represents a strategy of simultaneously buying C and selling D. The mean return for C is positive and significant for all markets except soybeans and sugar futures, and for all holding periods except the period of 2 weeks (in which it is significant only for corn futures). As expected, the mean return for D is negative and significant for all periods except the period of 2 weeks, and for all markets except cotton futures. The mean return for CMD is positive and significant for all markets and for all holding periods. The combination of large trader sentiments appears to be a stronger timing indicator than bullish or bearish large trader sentiments alone (see Table II). However, this timing strategy may not necessarily be superior to that based on the extreme large trader sentiments (see Table IV). For example, buying one wheat futures contract when hedgers are extremely bearish generates an average return of 2.89% in the period of 4 weeks, while buying one futures contract when speculators are bullish and hedgers are bearish gives rise to a return of only 0.91%. Similarly, selling one wheat futures contract when hedger are extremely bullish gives rise to an average return of 1.67%, while selling one futures contract when speculators are bearish and hedgers are bullish gives an average return of only 1.26%.

The second set of hypotheses is tested by forming two groups based on large trader sentiment: F and G. F represents the group with extremely bullish speculator sentiment (top 20%), along with extremely bearish hedger sentiment (bottom 20%), and G represents the group with extremely bearish speculator sentiment (bottom 20%), along with extremely bullish hedger sentiment (top 20%). The mean return is calculated for F and G in the subsequent periods of 2 weeks, 4 weeks, 6 weeks, and 8 weeks. The results are reported in Panel B of Table V. The mean return for F is positive and significant for all markets except sugar futures, and for all periods except the period of 2 weeks (in which it is significant for corn, wheat, cotton futures, as well as the portfolio). The mean return for G is uniformly negative and statistically significant for all markets except corn futures, and for all periods except the period of 2 weeks. It appears that the timing strategy of buying F consistently

TABLE V

Combinations of Large Trader Sentiments and Futures Returns (%) in Subsequent Periods (1993.1–2000.3)*

Panel A: Combinations of Large Trader Sentiments and Futures Returns†

	2 Week			*4 Week*			*6 Week*			*8 Week*		
	C	*D*	*CMD*	*C*	*D*	*CMD*	*C*	*D*	*CMD*	*C*	*D*	*CMD*
Corn	0.555	−0.426	0.975	1.845	−1.283	3.094	2.433	−1.709	4.068	3.184	−1.914	4.962
	(1.72)	(−1.21)	(1.96)	(4.18)	(−2.57)	(4.58)	(4.18)	(−2.98)	(5.07)	(4.48)	(−2.72)	(4.87)
Soybeans	0.100	−0.236	0.335	0.276	−1.247	1.292	0.315	−1.247	1.546	0.298	−1.646	1.914
	(0.34)	(−0.98)	(1.42)	(1.25)	(−2.28)	(1.99)	(1.38)	(−2.29)	(2.01)	(1.55)	(−2.68)	(2.24)
Soymeal	0.286	−0.012	0.299	0.305	−0.598	0.920	0.355	−0.724	1.027	0.533	−1.015	1.629
	(0.76)	(−0.03)	(078)	(1.69)	(−1.72)	(1.88)	(1.71)	(−1.77)	(1.99)	(1.74)	(−1.89)	(2.05)
Wheat	0.003	−0.212	0.211	0.912	−1.260	2.152	1.213	−1.926	3.088	1.584	−2.491	3.997
	(0.01)	(−0.68)	(0.60)	(1.65)	(−2.61)	(2.84)	(1.79)	(−3.37)	(3.53)	(2.03)	(−3.89)	(4.14)
Cotton	0.505	−0.123	0.627	1.536	−0.509	2.054	1.639	−0.558	2.192	1.503	−0.588	2.091
	(0.79)	(−0.37)	(0.98)	(1.89)	(−1.21)	(2.39)	(1.77)	(−1.10)	(2.01)	(1.68)	(−1.01)	(1.88)
World sugar	0.057	−0.537	0.591	0.763	−1.844	2.576	0.744	−2.551	3.222	0.455	−2.774	3.118
	(0.71)	(−1.16)	(0.96)	(1.57)	(−2.73)	(3.19)	(1.16)	(−2.94)	(3.12)	(0.59)	(−2.73)	(2.53)
Agricultural portfolio	0.052	−0.261	0.312	0.907	−1.117	2.001	1.071	−1.497	2.535	1.245	−1.791	2.984
	(0.32)	(−1.68)	(1.68)	(4.11)	(−5.29)	(6.74)	(3.88)	(−5.83)	(6.93)	(3.84)	(−6.00)	(6.94)

Panel B: Combinations of Extreme Large Trader Sentiments and Futures Returns (%)[‡]

	2 Week			*4 Week*			*6 Week*			*8 Week*		
	F	*G*	*FMG*	*F*	*G*	*FMG*	*F*	*G*	*FMG*	*F*	*G*	*FMG*
Corn	0.953	−0.012	0.966	3.241	−0.725	3.848	4.872	−0.473	4.903	6.573	−0.042	6.679
	(2.42)	(−0.02)	(1.22)	(5.79)	(−0.85)	(3.51)	(7.39)	(−0.55)	(4.56)	(9.30)	(−0.08)	(5.19)
Soybeans	0.405	−0.137	0.542	1.910	−0.859	2.312	1.789	−0.522	2.223	0.880	−0.782	2.122
	(0.92)	(−0.28)	(0.40)	(2.35)	(−1.68)	(1.79)	(2.14)	(−1.75)	(1.96)	(2.60)	(−1.85)	(2.51)
Soymeal	0.150	−0.443	0.590	2.181	−1.732	3.706	2.233	−1.903	3.853	2.239	−1.748	3.630
	(0.25)	(−0.97)	(0.48)	(2.73)	(−2.69)	(4.43)	(2.26)	(−2.14)	(3.02)	(1.99)	(−2.12)	(2.38)
Wheat	0.912	−0.543	1.455	3.111	−2.257	5.368	4.183	−1.698	5.803	4.823	−2.025	6.758
	(1.67)	(−0.78)	(1.76)	(3.73)	(−2.54)	(4.60)	(3.85)	(−1.76)	(4.18)	(4.14)	(−1.98)	(4.71)
Cotton	2.112	−0.714	2.842	4.828	−1.504	6.319	5.549	−1.993	7.534	4.212	−1.831	6.041
	(1.76)	(−1.15)	(2.08)	(2.85)	(−1.72)	(3.95)	(2.34)	(−2.06)	(5.89)	(1.86)	(−1.71)	(3.01)
World sugar	0.144	−0.822	0.918	0.909	−2.606	3.324	0.913	−2.986	3.679	0.773	−2.674	3.171
	(0.29)	(−1.05)	(1.09)	(1.50)	(−2.31)	(2.85)	(1.29)	(−2.19)	(2.40)	(0.78)	(−1.81)	(2.01)
Agricultural portfolio	0.344	−0.423	0.727	1.959	−1.649	3.374	2.401	−1.621	3.683	2.827	−1.401	3.778
	(1.79)	(−1.68)	(2.28)	(5.86)	(−4.72)	(7.59)	(5.69)	(−3.90)	(6.69)	(5.52)	(−2.99)	(5.98)

*The numbers in parentheses are *t*-statistics under the null hypothesis that the relevant parameter is zero, and are corrected for heteroskedasticity and autocorrelation based on Newey–West adjustment.

[†]C represents the group with bullish (above-the-median) speculator sentiment together with bearish (below-the-median) hedger sentiment. D represents the group with bearish (below-the-median) speculator sentiment along with above-the-median hedger sentiment.

[‡]F represents the group with extremely bullish speculator sentiment (top 20%) together with extremely bearish hedger sentiment (bottom 20%). G represents the group with extremely bearish speculator sentiment (bottom 20%) together with extremely bullish hedger sentiment (top 20%).

outperforms the strategy of selling G, with the exception of sugar futures, suggesting that extremely bullish speculator sentiment, together with extremely bearish hedger sentiment, are more valuable for forecasting future returns than extremely bearish speculator sentiment, along with extremely bullish hedger sentiment. The mean return for FMG is both economically and statistically significant for all markets and for all forecasting periods.

This result indicates that the combination of extreme large trader sentiments, on average, provides the most reliable forecast when compared to other alternatives. For example, simultaneously buying F and selling G in the agricultural portfolio approximately give rise to an average annualized holding-period return of 18.9%, 43.8%, 31.9%, and 24.6% in the subsequent periods of 2 weeks, 4 weeks, 6 weeks, and 8 weeks, respectively.[11] This return is, on average, larger than that for CMD, EHML, or HML for a futures market in the relevant period.

Hedging Pressure Effects vs. Superior Forecasting Skills of Large Speculators

We have shown that large trader sentiments forecast future market movements. It is possible to question what explains return predictability in futures markets. The finance literature postulates that hedger pressure is an important determinant of futures risk premiums. The use of hedging pressure as an explanation of futures premiums dates back to Keynes (1930) and Hicks (1939). The hedging-pressure theory argues that hedgers in futures markets who wish to transfer nonmarketable risks have to, and are willing to, pay risk premiums to speculators for the bearing of risk, suggesting that positive returns should be earned for a simple strategy of being long when hedgers are net short and short when hedgers are net long. The results presented in this article generally confirm hedging-pressure effects in the agricultural markets, namely, when hedgers are (extremely) bullish, they roughly hold net long positions, and, therefore, the futures price is expected to fall in order to compensate large speculators for taking short positions on the other side of the market, and vice versa.[12] In addition, it has been shown that hedging-pressure effects

[11]The annualized return is calculated by multiplying the holding-period return by 52 and then dividing by the number of holding periods (in weeks). For example, the annualized return for FMG in the portfolio for the period of 4 weeks is $3.374\% * (52/4) = 43.8\%$.

[12]Bullish (bearish) sentiment does not necessarily imply that hedgers hold net long (short) positions (see also 7). However, extremely bullish (bearish) sentiment coincides exactly with net long (short) positions in these futures markets.

tend to last for longer horizons (up to 8 weeks) than what have been examined previously in the literature.

Furthermore, it may be interesting to ask whether speculators in these agricultural futures markets earn higher returns than what have been paid by hedgers, or equivalently, do large speculators possess superior forecasting ability? To examine this issue, a methodology similar to that of Rockwell's (1967) was employed. Specifically, the hedging pressure effect is defined as the return earned by a hypothetical trader who follows a naïve strategy of being long when hedgers are (extremely) bearish, and short when hedgers are (extremely) bullish. The difference between the return earned by large speculators and that earned by the naïve trader represents superior forecasting ability of large speculators. Let J(L) represent the group with bullish (bearish) speculator sentiment, and K(M) represent the group with bearish (bullish) hedger sentiment. The grouping of bullish or bearish sentiment is based on the median sentiment. The mean return of buying (selling) K(M) roughly captures the hedging pressure effect. JMK (LMM) is a strategy of buying J(L) and selling K(M), and the mean return for JMK (LMM) measures superior forecasting ability of large speculators. In particular, a positive return for JMK and a negative return for LMM suggest that large speculators tend to possess superior forecasting ability. Similarly, let P(Y) represent the group with extremely bullish (bearish) speculator sentiment, and Q(Z) represent the group with extreme bearish (bullish) hedger sentiment. The mean return of buying (selling) Q(Z) captures the hedging-pressure effect, which is the average return earned by the naïve trader. PMQ (YMZ) is a strategy of buying P(Y) and selling Q(Z). A positive return for PMQ and a negative return for YMZ suggest that large speculators may have superior forecasting skills.

Panels A and B of Table VI present the evidence of superior forecasting ability of large speculators in the six agricultural futures markets. Unlike Rockwell (1967) and Chang (1985), who showed that large speculators in agricultural markets (wheat in Chang's study) possessed superior forecasting ability, no evidence is found of superior forecasting skills of large speculators. A positive return for JMK and a negative return for LMM only occur in soymeal and sugar futures for all the periods, but none is significant. The return for PMQ is positive for corn and wheat futures for all the periods, suggesting that speculators may possess certain superior forecasting ability on the long side, but insignificant. The mean return for YMZ is negative for wheat futures in the periods of 4 weeks, 6 weeks, and 8 weeks, but again insignificant. For the agricultural portfolio, the return for JMK, LMM, PMQ, and YMZ is neither economically nor statistically significant. This suggests that large

TABLE VI

Source of Return Predictability: Hedging Pressure Effect or Forecasting Ability of Large Speculators (1993.1–2000.3)

*Panel A: Forecasting Ability with Bullish (Bearish) Speculator Sentiment**

	2 Week		*4 Week*		*6 Week*		*8 Week*	
	JMK	*LMM*	*JMK*	*LMM*	*JMK*	*LMM*	*JMK*	*LMM*
Corn	−0.211	0.134	−0.526	0.404	−0.877	0.713	−1.090	0.917
	(−0.46)	(0.28)	(−1.07)	(0.59)	(−1.07)	(0.84)	(−1.15)	(0.91)
Soybeans	−0.096	0.135	−0.069	0.121	−0.001	0.059	−0.198	0.264
	(−0.58)	(0.32)	(−0.12)	(0.21)	(−0.01)	(0.09)	(−0.23)	(0.33)
Soymeal	0.658	−0.318	1.266	−0.299	0.928	−0.381	1.390	−0.382
	(1.36)	(−0.63)	(1.50)	(−0.44)	(1.30)	(−0.48)	(1.39)	(−0.40)
Wheat	0.148	−0.188	0.076	−0.083	−0.215	0.176	−0.091	0.062
	(0.05)	(−0.38)	(0.09)	(−0.12)	(−0.22)	0.22	(−0.09)	(0.06)
Cotton	−0.773	0.806	−0.784	0.854	−1.616	1.687	−2.138	2.183
	(−1.25)	(1.93)	(−0.87)	(1.50)	(−1.53)	(2.57)	(−1.78)	(2.80)
World sugar	0.321	−0.361	0.204	−0.247	0.037	−0.151	0.142	−0.276
	(0.54)	(−0.53)	(0.26)	(−0.26)	(0.04)	(−0.14)	(0.13)	(−0.20)
Agricultural portfolio	−0.064	0.037	−0.140	0.119	−0.377	0.347	−0.499	0.470
	(−0.30)	(0.17)	(−0.47)	(0.41)	(−1.04)	(1.03)	(−1.17)	(1.19)

Panel B: Forecasting Ability with Extremely Bullish (Bearish) Speculator Sentiment†

	2 Week		*4 Week*		*6 Week*		*8 Week*	
	PMQ	*YMZ*	*PMQ*	*YMZ*	*PMQ*	*YMZ*	*PMQ*	*YMZ*
Corn	0.507	−0.005	0.488	0.391	0.696	1.610	0.646	2.642
	(0.95)	(−0.01)	(0.69)	(0.40)	(0.84)	(1.45)	(0.63)	(2.06)
Soybeans	−0.157	−0.212	−0.259	−0.187	−0.014	0.352	0.404	0.545
	(−0.25)	(−0.36)	(−0.27)	(−0.23)	(−0.02)	(0.36)	(0.24)	(0.48)
Soymeal	−0.023	0.141	0.042	0.426	0.130	0.474	0.017	−0.028
	(−0.03)	(0.22)	(0.04)	(0.51)	(0.15)	(0.39)	(0.01)	(−0.02)
Wheat	−0.465	0.052	−0.694	−0.133	−0.829	−0.401	−1.389	−0.824
	(0.63)	(0.06)	(−0.81)	(−0.14)	(−0.74)	(−0.39)	(−1.07)	(−0.58)
Cotton	−0.195	0.432	0.591	0.557	1.185	0.205	2.301	0.391
	(−0.18)	(0.69)	(0.40)	(0.63)	(0.61)	(0.21)	(1.06)	(0.35)
World sugar	0.088	−0.045	0.089	0.269	0.022	0.227	0.076	0.995
	(0.13)	(−0.04)	(0.20)	(0.17)	(0.02)	(0.12)	(0.06)	(0.46)
Agricultural portfolio	−0.062	0.006	0.035	0.207	0.178	0.389	0.315	0.591
	(−0.20)	(0.18)	(0.08)	(0.48)	(0.35)	(0.76)	(0.53)	(0.98)

*JMK represents a strategy of buying J and selling K. LMM represents a strategy of buying L and selling M. J represents the group with bullish speculator sentiment. K represents the group with bearish hedger sentiment. L represents the group with bearish speculator sentiment. M represents the group with bullish hedger sentiment.

†PMQ is a strategy of buying P and selling Q. YMZ is a strategy of buying Y and selling Z. P represents the group with extremely bullish speculator sentiment (top 20%). Q represents the group with extremely bearish hedger sentiment (bottom 20%). Y represents the group with extremely bearish speculator sentiment (bottom 20%). Z is the group with extremely bullish hedger sentiment (top 20%).

speculators, on average, do not possess any superior forecasting ability in these agricultural futures markets.

CONCLUSIONS

The actual position-based sentiment by type of traders was studied in six actively traded agricultural futures markets—corn, soybeans, soymeal, wheat, cotton, and world sugar. It was found that large speculator sentiment is a price-continuation indicator. In contrast, large hedger sentiment is a contrary indicator. Small trader sentiment does not have any value for forecasting. Various sentiment-based timing strategies also were examined, and it was found that the combination of extreme large trader sentiments provides the strongest timing signal. This finding is of practical importance for futures traders. The implication is that buying when large speculators are extremely bullish and large hedgers are extremely bearish, and/or selling when large speculators are extremely bearish and large hedgers are extremely bullish in these agricultural futures markets consistently generate both economically and statistically significant profits.

The evidence that large hedger sentiment forecasts price reversals is consistent with the hedging-pressure theory in which it is argued that, to transfer nonmarketable risks, hedgers are willing to pay risk premiums to speculators. Thus, hedging-pressure effects explain the return predictability in these agricultural futures markets. Moreover, the hedging-pressure effects tended to last for longer horizons (up to 8 weeks) than what have been recognized and studied in the literature. Further examination was conducted of whether large speculators consistently earn more than what hedgers paid. It was found that it does not appear that large speculators possess any superior forecasting skills. This result differs from the findings in Rockwell (1967), Chang (1985), and Chang, Pinegar, and Schachter (1997) in which it had been shown that large speculators tended to be associated with superior forecasting ability in agricultural futures markets.

This study contributed to the literature in two ways. First, it examined the usefulness of investor sentiment based on trader actual positions for predicting agricultural futures returns. Second, it showed that hedging-pressure effects tend to prevail in the agricultural futures markets, and may last for longer horizons than those have been investigated in extant literature. Much works remain to be done in studying the determinants of investor sentiment and the value of forecasts based on trader sentiment in other futures markets.

BIBLIOGRAPHY

Arnold, C. (1995). PPS trading system. Toronto, Canada: Irwin Publishing.

Bessembinder, H. (1992). Systematic risk, hedging pressure, and risk premiums in futures markets. Review of Financial Studies, 47, 2015–2034.

Briese, E. (1994, May 2). Illuminating data: Commitments of traders report can disclose promise, perils in the market. Barron's, 20.

Chang, E. C. (1985). Returns to speculators and the theory of normal backwardation. Journal of Finance, 40, 193–208.

Chang, E. C., Pingenar, J. M., & Schachter, B. (1997). Interday variations in volume, variance and participation of large speculators. Journal of Banking and Finance, 21, 797–810.

Clarke, R. G., & Statman, M. (1998). Bullish or bearish. Financial Analysts Journal, 54, 63–72.

De Bondt, W. (1993). Betting on trends: Intuitive forecasts of financial risk and returns. International Journal of Forecasting, 9, 355–371.

De Roon, F., Nijman, T., & Veld, C. (2000). Hedging pressure effects in futures markets. Journal of Finance, 55, 1437–1456.

Fisher, K. L., & Statman, M. (2000). Investor sentiment and stock returns. Financial Analysts Journal, 56, 16–23.

Hicks, J. R. (1939). Value and capital. Cambridge, UK: Oxford University Press.

Hirshleifer, D. (1988). Residual risk, trading costs, and commodity futures risk premia. Journal of Political Economy, 1, 173–193.

Hirshleifer, D. (1990). Hedging pressure and futures price movements in a general equilibrium model. Econometrica, 58, 411–428.

Houthakker, H. S. (1957). Can speculators forecast prices? Review of Economics and Statistics, 39, 143–151.

Keynes, J. M. (1930). A treatise on money, Vol. 2. London, UK: Macmillian.

Newey, W. K., & West, K. D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. Econometrica, 55, 703–708.

Rockwell, C. (1967). Normal backwardation, forecasting, and the returns to commodity futures traders. Food Research Institute Studies, 7, 1967, 107–130.

Sanders, D. R., Irwin, S. H., & Leuthold, R. M. (1997). Noise traders, market sentiment, and futures price behavior. Working Paper. University of Illinois at Urbana-Champaign.

Solt, M. E., & Statman, M. (1988). How useful is the sentiment index? Financial Analysts Journal, 44, 45–55.

Stoll, H. R. (1979). Commodity futures and spot price determination and hedging in capital market equilibrium. Journal of Financial and Quantitative Analysis, 14, 873–894.

White, H. (1980). A heteroskedasticity consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica, 48, 817–838.